CLAIMS

1. An electrostatic actuation device, comprising:

- a flexible electrode (30), having a first and a second end, at least part of this electrode being mobile, or forming a mobile structure, relative to a substrate,

- two electrodes (32, 34), fixed relative to the substrate (22),

- means (18, 28) forming two pivots of the flexible electrode, located between both ends of the flexible electrode, each fixed electrode being located, while the device is operating, opposite a section of the flexible electrode located between one of the means forming a pivot and the end of the flexible electrode the closest to these means.

2. The device as claimed in claim 1, a load being placed on or fixed to the flexible electrode, between its two ends or between the means forming the two pivots.

3. The device as claimed in claim 2, the load being a mechanical load, and/or an electrical contact, and/or an electrical or optical component.

4. The device as claimed in claim 1 or 2, the flexible electrode being connected via a block (38) to a membrane (50).

5. The device as claimed in claim 4, the membrane forming a mirror or wave front corrector.

6. The device as claimed in any one of claims 1 to 5, the mobile part of the mobile electrode being mobile according to at least the direction perpendicular to the substrate.

7. The device as claimed in any one of claims 1 to 6, an insulating layer (20) being formed on the substrate and/or the flexible electrode.

8. The device as claimed in any one of claims 1 to 7, the means forming a pivot comprising at least one block (18) fixed relative to the substrate.

9. The device as claimed in claim 8, each block having a rounded end.

10. The device as claimed in any one of claims 1 to 9, the means forming a pivot comprising at least one arm positioned laterally relative to the flexible electrode, or two arms positioned on either side of this electrode.

11. The device as claimed in any one of claims 1 to 10, further comprising means for controlling each potential difference between the flexible or mobile electrode and each fixed electrode.

12. A method for producing an electrostatic actuation device, comprising:

- forming on a first substrate, a first part comprising a flexible electrode (30), having a first and a second end,

- forming in a second substrate, a second part comprising a substrate (22), two electrodes (32, 34), fixed relative to the substrate (22), and means (18, 28) for forming two pivots of the flexible electrode,

- assembling or putting in contact of the first and second parts, at least part of the flexible electrode being, after assembly, mobile relative to the substrate (22) of the second part, the means forming two pivots of the flexible electrode being located between the two ends of the flexible electrode, each fixed electrode being located, while the device is operating, opposite a section of the flexible electrode located between one of the means forming a pivot and the end of the flexible electrode closest to these means.

13. The method as claimed in claim 12, further comprising a step for forming a dielectric layer on the mobile electrode.

14. The method as claimed in claim 12 or 13, further comprising a step for forming a dielectric layer on at least the two fixed electrodes and the means forming a pivot.

15. A method for producing a deformable membrane, comprising:

- producing an electrostatic actuation device, as claimed in any one of claims 12 to 14,

- forming a membrane (40, 50), and means (38) for fixing this membrane to the flexible electrode (30).

16. The method as claimed in claim 15, the membrane acting as, or being the membrane of a mirror or wave front corrector.

17. An operating method for a device as claimed in any one of claims 1 to 11, in which:

- a potential difference is applied between the mobile electrode (30) and each fixed electrode (32, 34), the so-called first and second fixed electrodes respectively, this potential difference generating an attractive electrostatic force between the two electrodes of each couple of electrodes (mobile electrode, fixed electrode), such that:

- the means forming a pivot (18, 28) are support points for the mobile structure, when the latter is attracted by one and/or the other of the fixed electrodes (32, 34), the central part (31) of the flexible electrode, or the part of this flexible electrode located between the means forming a pivot (18, 28), moving, or rising and moving down, under the effect of mechanical forces, while the lateral parts are subject to electrostatic forces.

18. The method as claimed in claim 17, in which:

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is decreased, and if the potential difference between the second fixed electrode (34) and the mobile electrode (30) is increased, the mobile structure tips gradually towards the first fixed electrode (32),

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is increased, and if the potential difference between the second fixed electrode (34) and the mobile electrode (30) is decreased, the mobile structure tips gradually towards the second fixed electrode (34),

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is decreased, and if at the same time the potential difference between the second fixed electrode (34) and the mobile electrode (30) is decreased, the mobile structure moves down to the substrate, along an axis known as axis ZZ',

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is increased, and if at the same time the potential difference between the second fixed electrode (34) and the mobile electrode (30) is increased, the mobile structure rises by moving away from the substrate, along the ZZ' axis.

19. An operating method for a device as claimed in any one of claims 1 to 11, in which:

- a potential difference is applied between the mobile electrode (30) and each fixed electrode (32, 34), the so-called first and second fixed electrodes respectively, this potential difference generating an attractive electrostatic force between the two electrodes of each couple of electrodes (mobile electrode, fixed electrode), such that:

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is decreased, and if the potential difference between the second fixed electrode (34) and the mobile electrode (30) is increased, the mobile structure tips gradually towards the first fixed electrode (32),

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is increased, and if the potential difference between the second fixed electrode (34) and the mobile electrode (30) is decreased, the mobile structure tips gradually towards the second fixed electrode (34),

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is decreased, and if at the same time the potential difference between the second fixed electrode (34) and the mobile electrode (30) is decreased, the mobile structure descends to the substrate, along an axis known as axis ZZ',

- if the potential difference between the first fixed electrode (32) and the mobile electrode (30) is increased, and if at the same time the potential difference between the second fixed electrode (34) and the mobile electrode (30) is increased, the

mobile structure rises by moving away from the substrate, along the ZZ' axis.

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